



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/668,176

09/24/2003

Tatsunhide Tsuyuki

Q77300

4041

23373 7590 05/13/2008
SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

HUNG, YUBIN

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

05/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/668,176	Applicant(s) TSUYUKI ET AL.	
	Examiner YUBIN HUNG	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,7-16,18 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,7-16,18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment/Arguments

1. This is in response to amendment filed on 03/20/08, which has been entered.
2. Claims 3-6 and 17 have been canceled; currently claims 1, 2, 7-16, 18 and 19 are still pending.
3. In view of Applicant's amendment, the objection to claim 17 (canceled) under 37 CFR 1.75 has been withdrawn.
4. Regarding claim 1 Applicant argued that the Examiner is mistaking the claim language of claim 1 because the Examiner conceded that the difference Matsui corrected is not corresponding to the parallax of the eyes (P. 8, 2nd paragraph)
5. *However, what the Examiner conceded is that "the difference reduced in claim 1 is a difference NOT corresponding to the parallax of both eyes (as a geometric difference would be)." In other words, the Examiner merely pointed out that that the difference being reduced is not the geometric portion of the difference. As Applicant admits in the second paragraph on page 9, one portion of the difference is "the inevitable optical difference ("a parallax of both eyes") due to the geometrically separate location of the cameras' (i.e., the geometric difference) and the other is "the different contamination noise patterns or different photographic conditions due to the different*

cameras. Matsui corrects the latter, as disclosed at least in paragraphs 127-139, especially paragraphs 128 (especially last 3 lines) and 139 (especially last 9 lines). Therefore the argument is not persuasive.

6. Applicant' further argued that Matsui does not inherently correct the difference between superposed noise because "If the noise is as random as the Examiner alleges, then it is equally likely that the noise in both pixel pairs would amplify one another, not cancel each other out" (see the last full paragraph that starts on page 8 and continues on page 9).

7. *However, the Examiner has neither asserted nor relied upon the noises' canceling each other out. (If anything, the difference from the noise should be increased, not canceled out.) In the passage quoted by the Applicant (P. 9, lines 5-8) the Examiner merely described the random nature of the noise and that they contribute to the difference between a stereo image pair (i.e., their contribution is the second part of the difference that the Applicant admits in the second paragraph on page 9). Since in Fig. 18, step S304 Matsui corrects the data to make corresponding portions have same lightness (see also paragraphs 127-139, especially 128 and 139), the noise is reduced. Therefore the argument is not persuasive.*

8. Regarding claim 1, Applicant further asserted (1) that the apparatus of claim 1 maintains the first optical difference (P. 10, 2nd paragraph, line 2); (2) that cited

references fail to disclose “separating the detrimental component and useful component of the image data, (3) that Matsui cannot reduce or remove detrimental noise patterns and (4) that in Applicant’s invention the method of separating the detrimental component can be an image perceiving technique or frequency analysis (P. 10, 3rd paragraph for (2)-(4)).

9. *However, the features of (1), (2) and (4) above are not limitations of claim 1. (3) is mere allegation; regardless, the analyses of paragraph 5 and 7 above and the analysis in the rejection of claim 1 in the Office action mailed 12/20/07 clearly establish that Matsui discloses noise reduction as set forth in claim 1. Therefore the argument is not persuasive.*

(Note: The 35 USC 102 and 103 rejections below are from Office action mailed 12/20/07)

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claim 1, 2, 7-9 and 11-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsui et al. (US 2003/0128273).

12. Regarding claim 1, and similarly claims 13, 15 and 17, Matsui discloses an image processing apparatus [Fig. 16, ref. 1-8; P. 6, paragraph 123] comprising a processing unit [Fig. 16, ref. 1-9; P. 6, paragraph 123] which, in a pair of images formed to generate a difference corresponding to a parallax of both eyes [Fig. 17A, refs. 2-4 & 2-5; Fig. 17B, refs. 2-7 and 2-8; P. 5, paragraph 115, lines 5-6 (indicating that the images are for the left and the right eyes and therefore are according to the parallax of both eyes); note that because the images are captured at different location, the existence of geometric difference between them is inherent], performs a process of reducing a difference of at least one of the pair of images other than a geometric difference between image

structures corresponding to the parallax of both eyes [Fig. 17B, refs. 2-7 through 2-10 and Fig. 18, ref. S304 (lightness correction); P. 7, paragraph 139, especially lines 15-23; note that by making the intensity of corresponding portions similar, the intensity difference, which is not geometric, is reduced]. (Note that regarding claim 15, per the agreed-upon interpretation recited in the interview summary mailed 07/19/07 and affirmed in applicant's statement of substance of interview filed as part of this RCE submission, as well as paragraph 7.A of the office action mailed 07/19/07, the lightness difference between the image pair that Matsui's invention corrects (see the analysis above for claim 1) is considered a difference between image structures that is not geometric.)

13. Additionally, regarding the difference being super-imposed noise component, note that sensors (e.g., cameras) typically introduce random noise into the captured image frames [see, for example, Col. 1, lines 25-31 of Rashkovskiy et al. (US 6,563,536), which is recited here to show this well-known fact and is not relied upon for the rejection]. Because of its random nature, the noise (e.g., from dark current) contributes to the difference between any stereo image pair (since they will have random effects on the two images; for example, the intensity or color value of a pixel in one of the images may be increased due to noise but is decreased by noise in its corresponding pixel in the other image of the pair). Since Matsui corrects the difference between image pairs, it inherently corrects the difference between superimposed noise

Art Unit: 2624

(such as the random noise from dark current) as well, since, as discussed above, the superimposed noise contributes to the overall difference.

14. Regarding claim 2, Matsui further discloses that the pair of images are still images from a pair of video images [Fig. 16, refs. 1-1 & 1-4 and Fig. 17A, refs. 2-1 & 2-2 (capturing stereo video images); Fig. 17A, refs. 2-3 & 2-4 (still stereo image pair); P. 6, paragraphs 118, 127 and 128] formed to generate a difference corresponding to a parallax of both eyes [P. 5, paragraph 115, lines 5-6 (indicating that the images are for the left and the right eyes and therefore are according to the parallax of both eyes); note that a stereo pair of images inherently has a difference corresponding to a parallax].

15. Regarding claim 7, Matsui further discloses

- a recognition unit which recognizes the geometric difference between image structures corresponding to the parallax of both eyes in the pair of images [Fig. 16, ref. 1-9; Fig. 18, ref. S303 (the largest cross correlation indicates the geometric difference). Note that per P. 6, paragraph 123, the CPU 1-9 executes applications and since it is the only unit capable of doing so (among the components of the apparatus 1-8), the application as the one specified in S303 of Fig. 18 necessarily has to be executed by the CPU and therefore it also serves as the recognition unit]
- wherein the processing unit performs a process of reducing a difference other than the geometric difference between the image structures recognized by the recognition unit in the pair of images [Per the analysis of claim 1; see especially Fig. 18, refs. S303 and S304]

16. Regarding claim 8, Matsui further discloses that the geometric difference is recognized by performing matching [Fig. 18, ref. S303, note that cross correlation is a form of matching].

17. Regarding claim 9, Matsui further discloses that the processing unit performs, as the process of reducing the difference other than the geometric difference between the image structures

- at least one of a process of removing a noise component superposed on only one of the pair of images from the one image or a process of correcting at least one of the pair of images to eliminate or reduce a difference between noise components which are different from each other and superposed on corresponding regions on the pair of images
[Matsui: Fig. 18, ref. S304; P. 7, paragraph 139, lines 18-23 (correction applied to one or both images)]

18. Regarding claim 11, and similarly claims 16 and 18, Matsui further discloses applying correction to one or both of the pair of images [P. 7, paragraph 139, especially lines 21-23] and that the correction amount is averaged noise components [P. 7, paragraphs 142 & 143, especially the last 6 lines of paragraph 143; note that $e(x,y)$ is the difference between corresponding pixels of the two images and (as discussed in claim 1) includes noise component and its average is therefore considered the averaged noise component].

19. Regarding claim 12, Matsui further discloses obtaining the pair of images of the same scene by using (1) more than one *or* (2) only one image pickup device [Fig. 16, refs. 1-1 & 1-4; Fig. 17A, refs. 2-1 & 2-2 (using two devices); P. 5, paragraph 115, lines 5-6 (indicating that the images are for the left and the right eyes and therefore are according to the parallax of both eyes)]

20. Claim 14, which is the corresponding medium claim of claims 1 (apparatus) and 13 (method), is rejected because per the analysis of claims 1 and 13 Matsui discloses

Art Unit: 2624

the difference reduction process recited in the claim 14 and further discloses a storage medium for storing applications [Fig. 16, ref. 1-10 and P. 6, paragraph 123; see also P. 11, claim 32].

21. Regarding claim 19, Matsui further discloses that the non-geometric difference is a color difference [P. 8, paragraph 157].

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. (US 2003/0128273) as applied to claims 1, 2, 7-9 and 11-19 above, and further in view of Aucsmith et al. (US 6,873,723) and Rashkovskiy et al. (US 6,563,536).

24. Regarding claim 10, Matsui discloses all limitations of its parent, claim 7. In particular, regarding determining noise component, note that Matsui discloses that to reduce a difference (e.g., lightness), the component (i.e., the correction amount) that causes that difference is first determined by comparing the corresponding regions [Fig. 18, ref. S304 and P. 7, paragraph 139, especially lines 15-23]. Further note that per the analysis of claim 1 the difference includes noise components. Matsui also discloses determining corresponding regions based on geometrical difference [Fig. 18, ref. S303 and P. 7, paragraph 139, especially lines 7-15].

Additionally Aucsmith disclose that the processing unit that divides the pair of images into sectional regions [Fig. 5 (regions); Fig. 7, ref. 720 (dividing); Col. 5, line 62-Col.6,

Art Unit: 2624

line 10; Col. 6, lines 62-64] and performs operations such as determining correspondence in the image pair based on the geometric difference on sectional region basis [Fig. 7, ref. 730 (matching, i.e., determining corresponding region); Col. 6, line 64-Col. 7, line 2].

Matsui and Aucsmith are combinable because they all have aspects that are from the same field of endeavor of stereoscopy.

At the time of the invention it would have been obvious to one of ordinary skill in the art to modify Matsui with the teachings of Aucsmith by dividing the images into regions and determining regions from different images that correspond to each other as well as the noise component that causes non-geometric difference. The reason would have been to establish the correspondence between the left and the right images so the depth of regions can be computed [Aucsmith: Col. 4, lines 10-13] and that the foreground and background can be separated [Aucsmith: Col. 1, lines 21-35].

Therefore it would have been obvious to combine Aucsmith with Matsui to obtain the invention as specified in claim 10.

Conclusion and Contact Information

25. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUBIN HUNG whose telephone number is (571)272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2624

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Yubin Hung
Patent Examiner
Art Unit 2624

/Yubin Hung/
Patent Examiner, Art Unit 2624

May 8, 2008